



SMART PIPE®

**A Trenchless Technology System
That Gives A **New** and **Better** Life To
Disadvantaged High Pressure Pipelines**



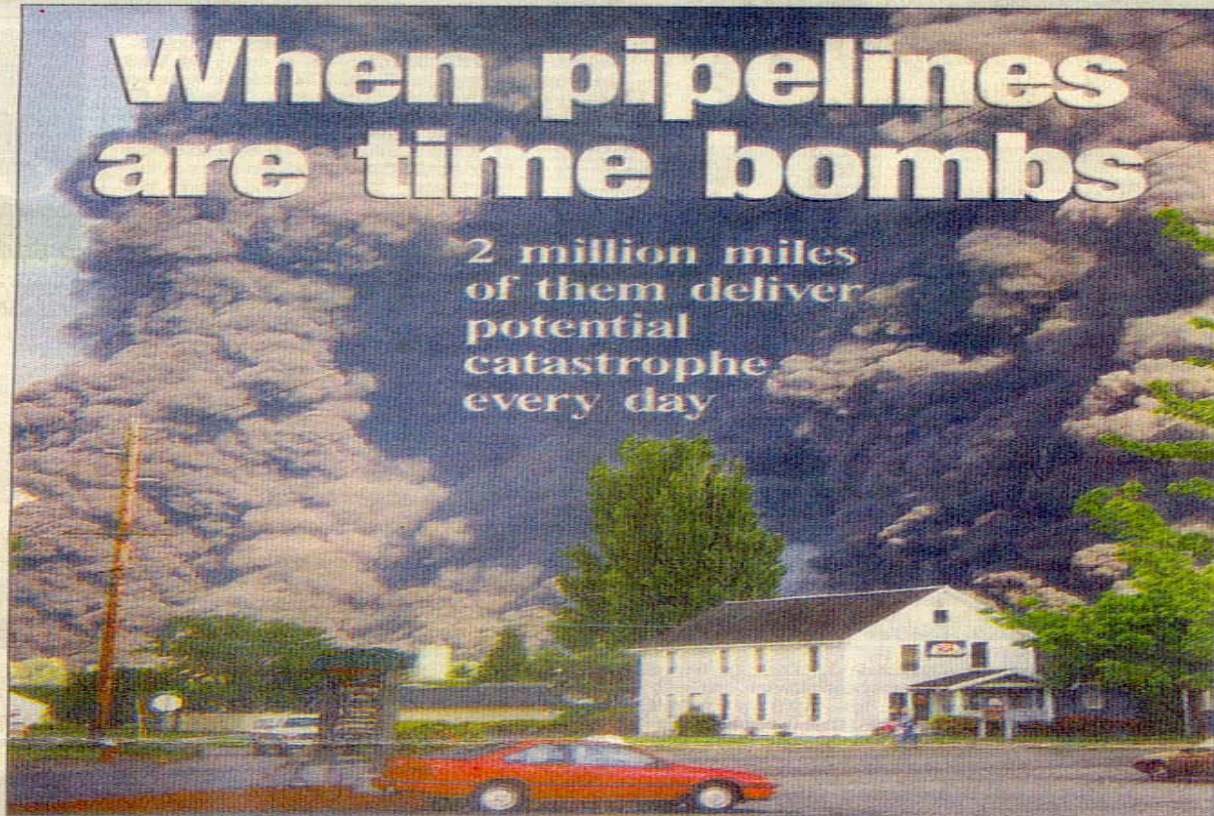
THE NATION'S NEWSPAPER

USA TODAY

NO. 1 IN THE USA . . . FIRST IN DAILY READERS

When pipelines are time bombs

2 million miles
of them deliver
potential
catastrophe
every day



By Angela Lee Holstrom, Bellingham Herald, via AP

June 10, 1999: Three boys were killed in Bellingham, Wash., when a river of fuel exploded.



What is Smart Pipe®?

- A composite of thermoplastic materials designed as a tight fitting liner, or as a stand alone pipe
- Restores strength to degraded and damaged steel pipe
- Provides 24/7 monitoring to detect leaks, impacts, and ground movements
- Developed by the team that successfully invented and commercialized U-Liner & Wellstream

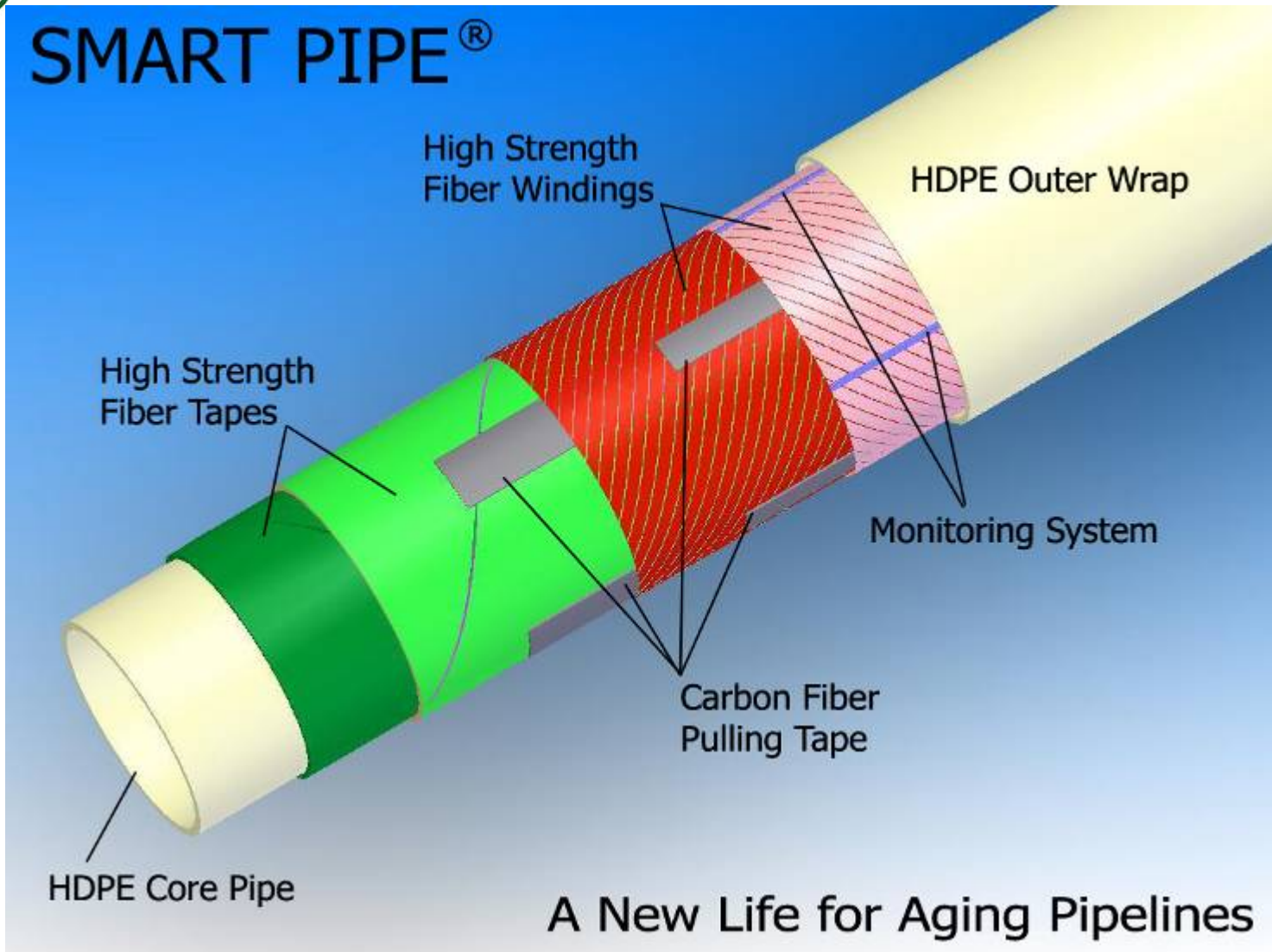


A Smart Pipe Installation Will be Most Cost Effective for Pipelines Having:

- Pressures of 150 psi and above
- Diameters of 6 inch and above
- Installation lengths over 500 feet
- Locations in difficult to access and/or environmentally sensitive areas



Schematic of Typical Design





Manufacturing and Installation of Smart Pipe



Portable Environmentally Controlled Factory on Right-Of-Way



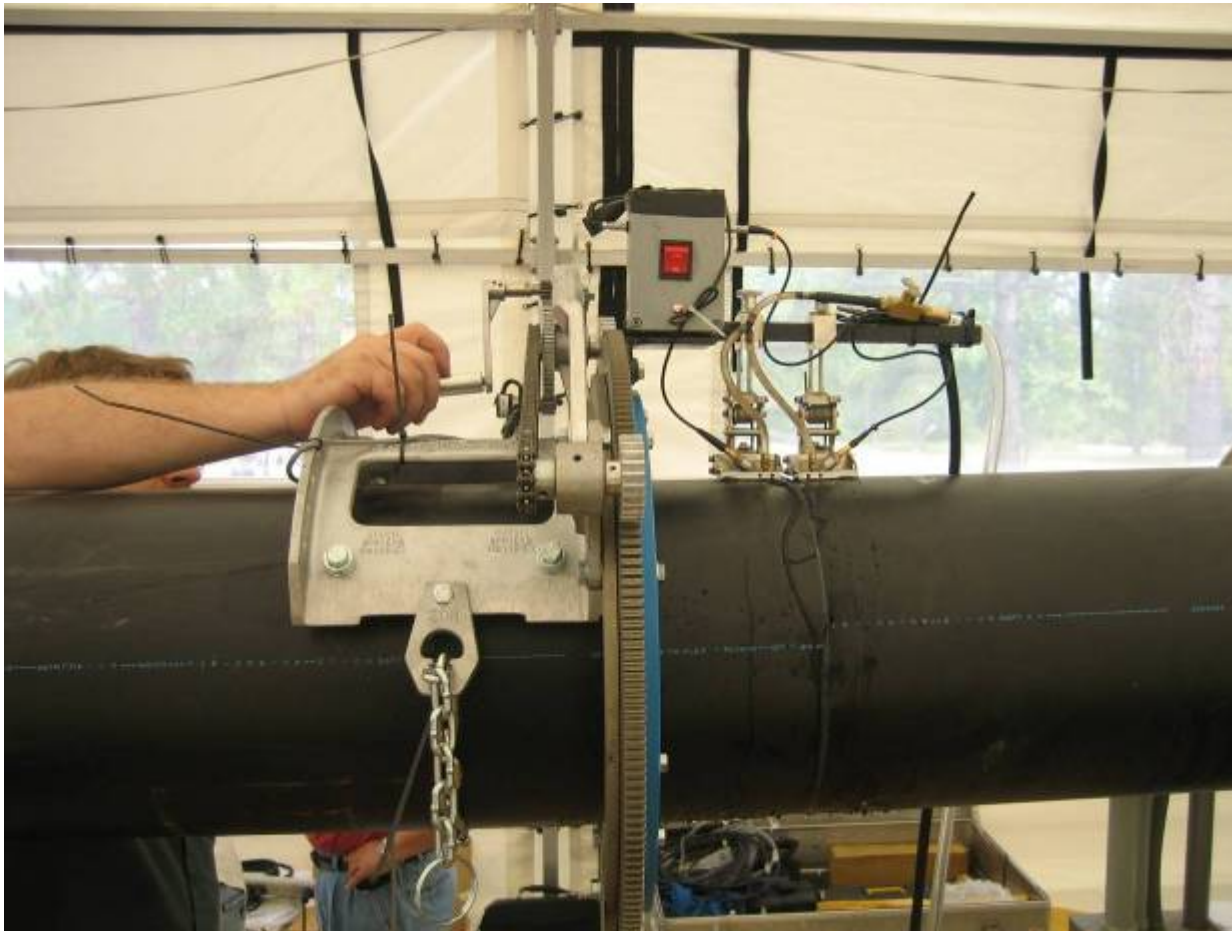


First Stage: (1) Joining of Core Pipe by Butt Fusion Welding





First Stage: (2) Ultrasonic Inspection of the Butt Fusion Joints





Second Stage: Co-helical Wrapping of High Strength Fabrics





Third Stage: Laying Pulling Tapes & Fiber Optic Sensors

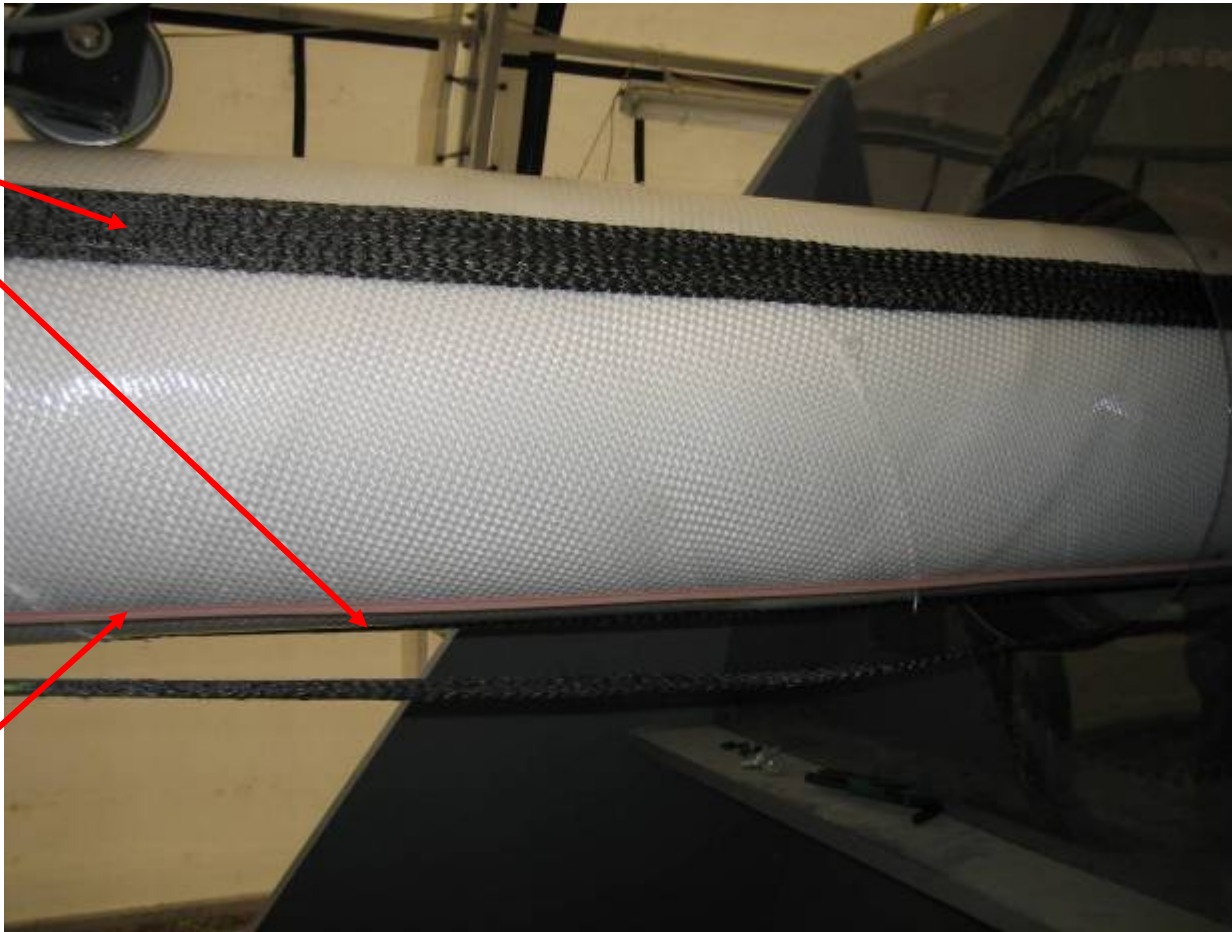




View of Fiber Optic Sensors & Pulling Tapes

Pulling
Tapes
(4)

Fiber Optic
Sensor





Fourth Stage: Laying Fiber Tows to Encapsulate Sensors & Pulling Tapes



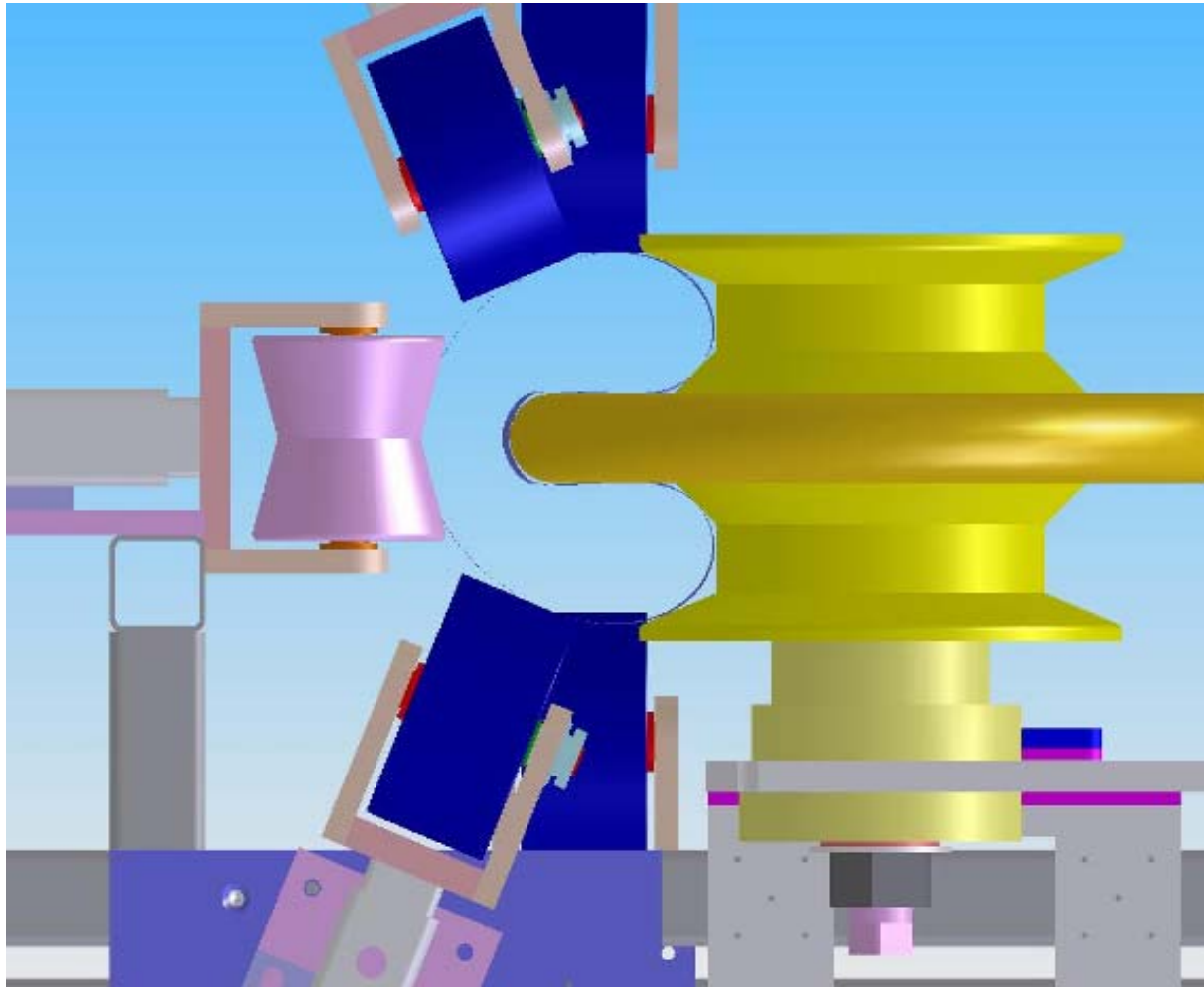


Fifth Stage: Deforming into a C-Shape by a Set of Three Rollers





Schematic View of the Final Deformation in the C-Forming Machine Showing the FEA Analysis Result Used for the Design





Sixth Stage: Binding with Mylar Tape & Outer Wrap





C-Formed Liner After Installation into Host Pipe





Installation of End Connectors





Re-Rounding Process Producing Tight Fitting Smart Pipe, Prior to Testing





Unique Advantages of the Smart Pipe System to the Pipeline Owner/Operator



Smart Pipe Installation

1. Portable factory enables very long installation lengths with minimal downtime
2. Simultaneous manufacturing and installation eliminates in-field welding
3. Minimal Excavation & Permitting Required (only two locations per installation segment)



Mechanical Performance

1. Restores (or exceeds) the original pressure capability of the pipeline
2. Eliminates corrosion concerns and need for smart pigging
3. Over compensates for loss of flow area with reduced product flow resistance



The Monitoring System

1. Embedded fiber optic sensors provide 24/7 continuous monitoring
2. Anomalies can be located within ± 1 meter in ten mile lengths
3. Leaks, mechanical impacts and ground movements instantaneously detected



Lagniappe

- An annular venting system allows permeated gases (if any) to be continuously removed
- For short installation lengths, pipe can be coiled for shipment
- On-demand inspection reports can be routinely provided
- Could prevent leaks from third party impacts and malevolent attacks

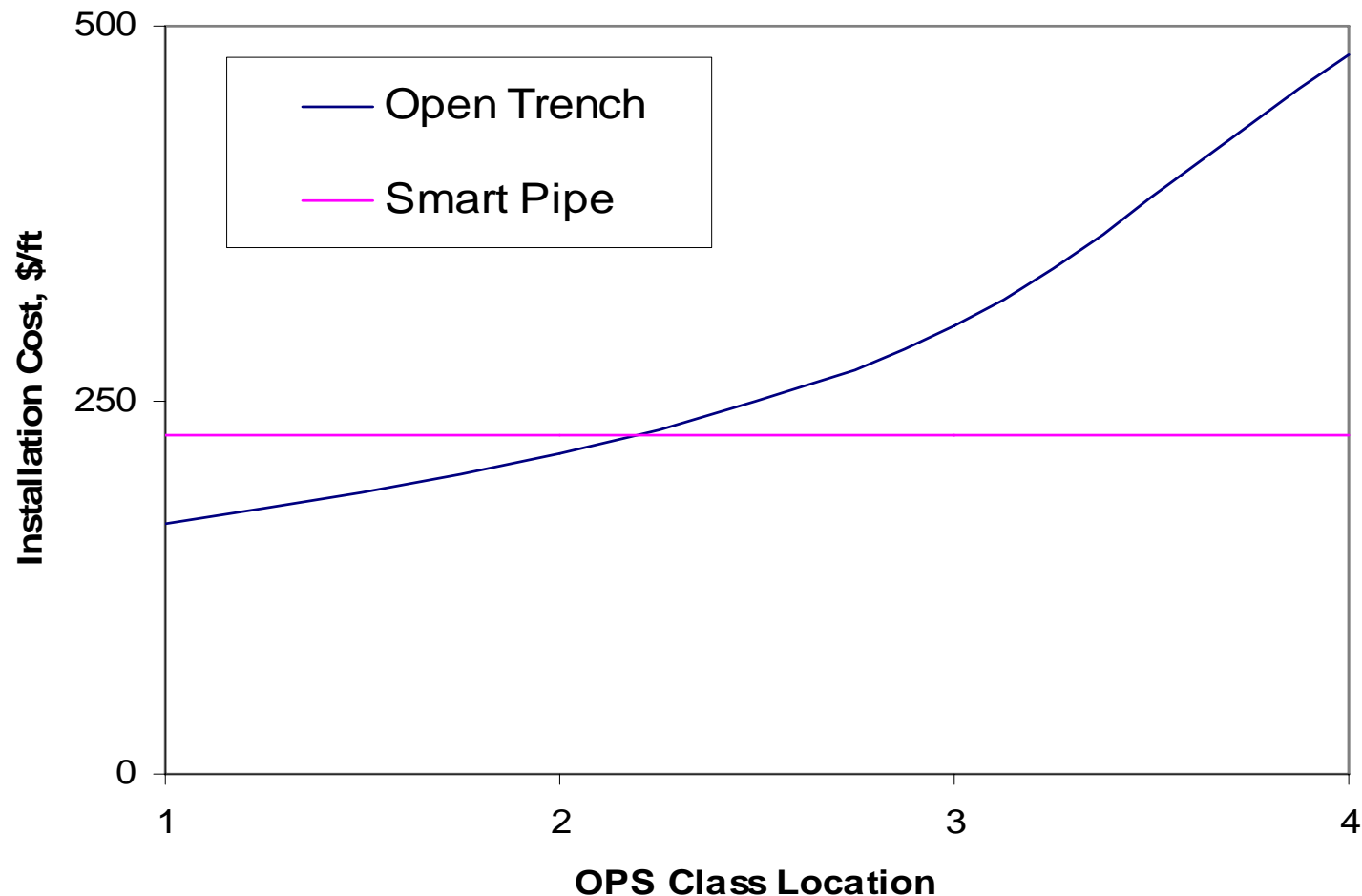


Smart Pipe Might Not be the Optimum Choice to Rehabilitate Pipelines that:

- Have a high frequency of laterals that need to be accommodated
- Have a great many severe bends and/or major elevation changes
- Transport very high temperature fluids
- Are short lengths in CFR location class 1 where open trench operations are not costly



Comparison of Representative Installation Costs for Smart Pipe vs Open Trench for 8" Diameter Pipe





Industry Recognition

- Best Business Plan for a New Technology Company - Tulane University - December 2004
- Top 5 Best Emerging Technologies - Rice Alliance - August 2006
- New Technology Development Award (ACE) - American Composites Institute - November 2006
- Heartbeat of America - Chosen by Senior Producer to showcase product on technology development television show – Date TBA



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maximizes
efficiency**

A350 XWB Gets Green Light



Summary and Conclusions



Summary

- Smart Pipe is a project specific engineered solution for many pipeline rehabilitation applications
- Installations are cost competitive in class 1 and 2 locations, but much more economical in class 3 and 4 compared to open trench
- Lifetime costs are significantly less than steel because corrosion protection and smart pigging are unnecessary



Current Operational Status

- Portable factory for 6" to 16" pipe is operable
- First Smart Pipe installation successfully completed in July 2006
- Next installation anticipated for Mid 2007
- Negotiations on installations with major gas/liquid energy companies are in progress
- Communications with DoT/OPS are in progress to pave the way for waiver applications



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The Smart Pipe Team

Thanks You for Your Kind Attention!

